National Defence University

# LOAD CARRIAGE EXERCISES WITH TWO DIFFERENT LOADS AND THEIR EFFECTS ON SOLDIERS PHYSIOLOGY

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# Agenda

- Introduction
- Methods
- Results
- Discussion
- Conversation

# Introduction

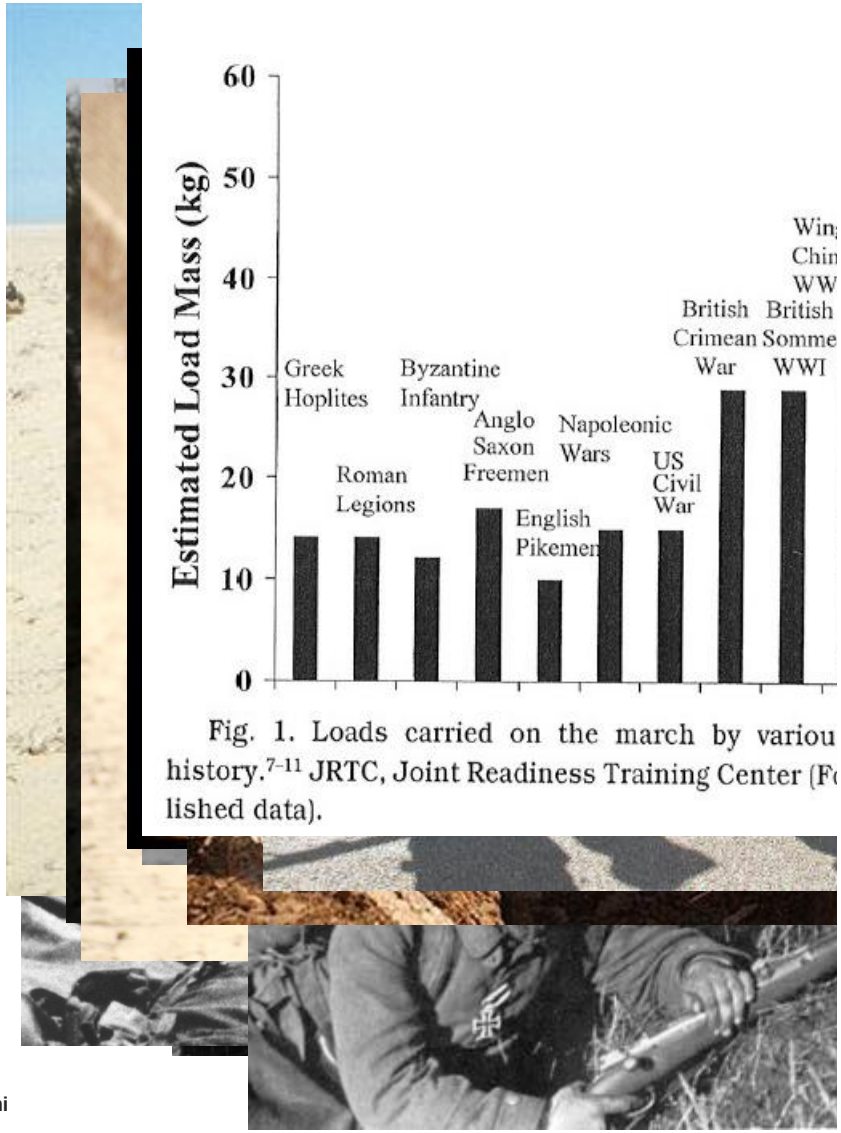


Fig. 1. Loads carried on the march by variou
history.[7–11] JRTC, Joint Readiness Training Center (F
lished data).

**Table 2** Soldier loads carried by duty position in a light infantry unit in Afghanistan (Dean 2004)

| Duty position | Fighting load (kg) | Approach march load (kg) | Emergency approach march load (kg) |
|---|---|---|---|
| Rifleman | 29 | 43 | 58 |
| M203 grenadier | 32 | 48 | 62 |
| Automatic rifleman | 36 | 50 | 64 |
| Antitank specialist | 31 | 45 | 59 |
| Rifle team leader | 29 | 43 | 59 |
| Rifle squad leader | 28 | 43 | 58 |
| Forward observer | 26 | 41 | 58 |
| Forward observer radio/telephone operator | 27 | 39 | 54 |
| Weapons squad leader | 28 | 45 | 60 |
| M240 machine gunner | 37 | 51 | 60 |
| M240B assistant gunner | 32 | 55 | 67 |
| M240B ammunition bearer | 31 | 53 | 65 |
| Rifle platoon sergeant | 28 | 41 | 54 |
| Rifle platoon leader | 28 | 42 | 53 |
| Platoon medic | 25 | 42 | 54 |
| Radio/telephone operator | 29 | 45 | No data |
| Mortar section leader | 26 | 50 | 68 |
| Mortar squad leader | 28 | 58 | 65 |
| 60-mm mortar gunner | 29 | 49 | 61 |
| 60-mm mortar assistant gunner | 25 | 55 | No data |
| 60-mm mortar ammunition bearer | 24 | 46 | No data |
| Rifle company communication chief | 31 | 50 | No data |
| Fire support officer | 25 | 42 | No data |
| Fire support non-commissioned officer | 24 | 41 | 65 |
| Sapper engineer | 27 | 43 | 60 |
| Company executive officer | 27 | 42 | No data |
| Company first sergeant | 29 | 41 | 57 |
| Company radio/telephone operator | 29 | 44 | 59 |
| Rifle company commander | 30 | 44 | 50 |
| Average | **29** | **46** | **60** |

# Methods

| TABLE 1. Test Subjects n=8) | | | | |
|---|---|---|---|---|
| | ***Mean*** | ***SD*** | ***Min*** | ***Max*** |
| **Height (cm)** | 180 | 10 | 168 | 196 |
| **Weight (kg)** | 77,9 | 12,3 | 55,3 | 90,9 |
| **Bodyfat (%)** | 12,5 | 3,3 | 8,6 | 16,7 |
| **BMI** | 23,9 | 2,4 | 19,6 | 26,7 |
| **$VO_{2max}$($ml \cdot min^{-1} \cdot kg^{-1}$)** | 51,8 | 4,2 | 46,1 | 56,7 |
| **Legpress (N)** | 3881 | 940 | 2490 | 5510 |
| **Penchpress (N)** | 950 | 163 | 760 | 1310 |
| **Standing long jump (m)** | 2,30 | 0,20 | 2,20 | 2,60 |
| **Pushup (rep/min)** | 45 | 18 | 28 | 79 |
| **Situp (rep/min)** | 53 | 5 | 43 | 60 |
| **End time 29kg (min:s)** | 52:28 | 01:11 | 51:00 | 54:02 |
| **End time 45kg (min:s)** | 50:80 | 0:59 | 49:27 | 52:28 |

**TABLE 2. Correlations between time to exhaustion and pre-load carriage physical fitness test**

| | *29kg* | *45kg* |
|---|---|---|
| **Height (cm)** | r=0,46 | r=0,61 |
| **Weight (kg)** | r=0,50 | r=0,72* |
| **Bodyfat (%)** | r=-0,15 | r=0,05 |
| **Lean body mass (kg)** | r=0,55 | r=0,74* |
| **Fat mass (kg)** | r=0,10 | r=0,32 |
| **BMI** | r=0,37 | r=0,56 |
| **$VO_{2max}$ (ml·min $^{-1}$)** | r=0,80* | r=0,92** |
| **$VO_{2max}$ (ml·min$^{-1}$·kg$^{-1}$)** | r=0,50 | r=0,33 |
| **Legpress (N)** | r=0,52 | r=0,33 |
| **Penchpress (N)** | r=0,75* | r=0,81* |
| **Standing lon jumps (cm)** | r=0,80* | r=0,68 |
| **Pushup (rep/min)** | r=0,20 | r=0,07 |
| **Situp (rep/min)** | r=0,02 | r=-0,08 |
| ***p<0,05, **p<0,01** | | |

# Discussion

- Upper body strenght and aerobic endurance are infantry soldiers vital characteristics
- Maximal aerobic capasity is also vital, but..
- Body composition might be a factor but..
- Practical applications
  - Spefic training methods for specific occupational tasks
  - More focus on strenght training education
  - VO2max values should not be used to estimate soldiers abilities in load carriage tasks

# Conversation

- Thank you..